Claims

1. Biocompatible ceramic composition comprised of calcium aluminate phases of the following composition:

less than 50 vol.%, preferably less than 10 vol.%, of CA_2, based on the total volume of the calcium aluminate phases,

more than 50 vol.%, preferably more than 90 vol.% of CA and $C_{12}A_7$, based on the total volume of the of calcium aluminate phases,

less than 10 vol.%, preferably less than 3 vol.% of C_3A, based on the total volume of the of calcium aluminate phases, and

optionally suitable additives,

wherein the sum of all components amounts to 100 %, and wherein the CA-phases amounts to at least 50%, preferably at least 70%, most preferably at least 90%.

2. Biocompatible ceramic composition according to claim 1, **characterised in that** it further comprises the hydraulic powders calcium silicate and/or calcium sulphate in an amount less than 50 vol.% of the total volume of hydraulic ingredients.

3. Biocompatible ceramic composition according to claim 1, **characterised in that** it further comprises a non-hydraulic filler comprising calcium titanate or any other ternary oxide of perovskite structure according to the formula ABO_3, where O is oxygen and A and B are metals, or any mixture of such ternary oxides, said filler being present in an amount of less than 30 vol.%, preferably less than 10 vol.% of the total volume of the ceramic ingredients.

4. Biocompatible ceramic composition according to claim 3, **characterised in that** A in the perovskite structure is selected from the group comprising Mg, Ca, Sr or Ba, and that the B in the perovskite structure is selected from the group comprising Ti, Zr, or Hf.

5. Biocompatible ceramic composition according to claim 1, **characterised in that** it further comprises particles or powder of one or more biocompatible materials

selected from the group comprising calcium carbonate, calcium phosphate, apatite, fluoroapatite, carbonates-apatites, and hydroxyapatite, the total amount of which should be less than 30 vol.% of the total volume of the ceramic ingredients.

6. Biocompatible ceramic composition according to claim 1, **characterised in that** it further comprises a component which is a water reducing agent based on a compound selected from the group comprising polycarboxylic acids, polyacrylic acids, and superplasticisers, such as Conpac 30®.

7. Biocompatible ceramic composition according to claim 1, **characterised in that** it further comprises expansion controlling additives such as fumed silica and/or calcium silicate.

8. Biocompatible ceramic composition according to claim 1, **characterised in that** it further comprises a water-based curing liquid.

9. Biocompatible ceramic composition according to claim 8, **characterised in that** the curing liquid further comprises an accelerator agent which accelerates the hardening process, which accelerator agent is selected from the group comprising lithium chloride, lithium hydroxide, lithium carbonate, lithium sulphate, lithium nitrate, lithium citrate, calcium hydroxide, potassium hydroxide, potassium carbonate, sodium hydroxide, sodium carbonate, sodium sulphate and sulphuric acid.

10. Biocompatible ceramic material according to claim 9, **characterised in that** LiCl is present in an amount of 10-500 mg in 100 g of curing liquid.

11. Biocompatible ceramic composition according to claim 8, **characterised in that** the curing liquid further comprises a retarder agent which retards the hardening process, which retarder agent is selected from the group comprising polysaccharide, glycerine, sugars, starch, and cellulose-based thickeners.

12. Biocompatible ceramic composition according to claim 1, **characterised in that** the grain size of the powder/particle raw material used is predominately less than 20 microns, preferably less than 10 microns, and most preferably less than 3 microns.

13. Biocompatible ceramic composition according to claim 1, **characterised in that**

the biocompatible ceramic composition generates temperatures of 30-150°C when cured in a living human body.

14. Biocompatible ceramic composition according to claim 1, **characterised in that** the expansion during curing of the material is ≤ 0,8 %.

15. Biocompatible ceramic composition according to claim 1, **characterised in that** it has a compressive strength of at least 100 MPa.

16. Biocompatible ceramic composition according to claim 1, **characterised in that** it is cured.

17. A medical device comprising a cured biocompatible ceramic composition according to claim 1.

18. Method for manufacturing a biocompatible ceramic composition according to claim 1, which comprises the steps of:

preparing a calcium aluminate/powder mixture of selected phase composition and grain size, and

curing said mixture by treating the biocompatible ceramic composition with a curing agent, such as a water-based curing liquid or vapour, or by preparing a slurry from said water-based curing liquid and the biocompatible ceramic composition.

19. Method of manufacturing according to claim 18, **characterised in that** it further comprises the step of removing any residual water or organic contamination from the powder mixture before curing.

20. Medical implant comprising the biocompatible ceramic composition according to claim 1.

21. Orthopaedic implant comprising the biocompatible ceramic composition according to claim 1.

22. Dental filling material or dental implant comprising the biocompatible ceramic composition according to claim 1.

23. Drug carrier for drug delivery in a patient's body comprising the biocompatible ceramic composition according to according to claim 1.

24. Method of using a biocompatible ceramic composition according to claim 1 for therapeutic treatment by the heat generated from said compositions when curing.

25. Method of generating heat in vivo in a patient's body for therapeutical purposes (*e.g.* cancer treatment, vascular treatment, pain relief, and activation of drugs), comprising the following steps:

preparing a calcium aluminate powder mixture comprising less than 50 vol.%, preferably less than 10 vol.%, of CA_2, based on the total volume of the calcium aluminate phases, more than 50 vol.%, preferably more than 90 vol.% of CA and $C_{12}A_7$, based on the total volume of the of calcium aluminate phases, less than 10 vol.%, preferably less than 3 vol.% of C_3A, based on the total volume of the of calcium aluminate phases, and wherein the CA-phases amounts to at least 50%, preferably at least 70%, most preferably at least 90%.

optionally adding calcium silicate and/or calcium sulphate in an amount less than 50 vol.% of the total volume of hydraulic ingredients,

optionally adding non-hydraulic filler in an amount of less than 30 vol.%, preferably less than 10 vol.% of the total volume of the ceramic ingredients,

optionally adding particles or powder of one or more biocompatible materials, the total amount of which should be less than 30 vol.% of the total volume of the ceramic ingredients,

optionally reducing the size of the powder/particle material to less than 20 microns, preferably less than 10 microns, and most preferably less than 3 microns.

optionally removing any residual water or organic contamination from the powder mixture,

optionally adding viscosity and workability controlling additives such as water reducing agents, expansion controlling additives, curing accelerator and retarder additives,

and introducing the composition into the body at a specific location of therapeutic treatment,

and curing the composition in situ in a patient's body.

26. Method according to claim 25, **characterised in that** the biocompatible ceramic composition, prior to the introduction into a patient's body, is mixed with a curing agent, thereby obtaining a slurry.

27. Method according to claim 25, **characterised in that** the biocompatible ceramic composition introduced into a patient's body is treated with a curing agent.

28. Method according to claim 26, **characterised in that** the curing agent is a water-based solution or water vapour.

29. Method according to claim 27, **characterised in that** the curing agent is a water-based solution or water vapour.

30. Therapeutic method comprising the steps of introducing a biocompatible ceramic composition into a patient's body and curing said composition, whereby heat is generated.